

WE CLAIM:

1. A parallel optics subassembly for mating with a ferrule supporting an array of optical fibers adapted for carrying digital signals and having a set of alignment holes positioned in a precisely spaced relationship with said fibers, comprising:
  - a) a receptacle for guiding and latching said ferrule into position including a window at the inner end of the receptacle;
  - 10 b) a carrier assembly for supporting an optoelectronic device having an array of photoactive components; and
  - c) a lens and alignment frame defining an optical and mechanical interface between said ferrule and said carrier assembly which is mounted on said carrier assembly in a precisely positioned relationship with said 15 optoelectronic device, said frame including:
    - an array of lenses for focusing light between said array of fibers and said array of photoactive components,
    - a tower extending outward from said frame for engaging said window in said receptacle and helping to position said receptacle with 20 respect to said frame, and
    - a set of guide pins projecting forward of said tower for mating with said alignment holes on said ferrule and positioning said ferrule with respect to said frame and optoelectronic device.
- 25 2. The parallel optics subassembly of claim 1, wherein:
  - said tower has a rectangular base and includes a pair of elevated sections located on opposing ends of said tower on which said guide pins are mounted.

3. The parallel optics subassembly of claim 2, wherein:  
said array of lenses extends in a line between said elevated sections.

5 4. The parallel optics subassembly of claim 1, wherein:  
said window in said receptacle is rectangular and said tower is  
rectangularly shaped so as to mate with said window.

5. The parallel optics subassembly of claim 1, wherein:  
10 said carrier assembly includes a frame section on which said  
optoelectronic device is mounted a flex circuit for providing electrical  
interconnections and a printed circuit board having an electrical edge connector  
for removably connecting to computer or communications systems.

15 6. A parallel optics subassembly for mating with a ferrule supporting an array  
of optical fibers adapted for carrying digital signals and having a set of  
alignment holes positioned in a precisely spaced relationship with said fibers,  
comprising:  
20 a) a receptacle for guiding and latching said ferrule into an  
interconnected position with said subassembly;  
b) a carrier assembly for supporting an optoelectronic device having an  
array of photoactive components; and  
c) a lens and alignment frame defining an optical and mechanical  
interface between said carrier assembly and said ferrule which is attached to  
25 said carrier in a precisely spaced relationship with said optoelectronic device,  
including:  
a tower extending outward from said frame including a set of  
elevated end sections,

an array of lenses mounted on said tower in between said elevated end sections for focusing light between said array of fibers and said array of photoactive components, and

5 a set of guide pins projecting forward from said elevated end sections on said tower for mating with said alignment holes on said ferrule and positioning said ferrule with respect to said frame and optoelectronic device.

7. The parallel optics subassembly of claim 6, wherein:

10 said tower includes a rectangular base and said elevated end sections are located on opposing ends of said rectangular base.

8. The parallel optics subassembly of claim 7, wherein:

15 said receptacle includes a rectangular window at its inner end for mating with said tower and helping to position said receptacle with respect to said frame and thereby helping to assure that said ferrule is accurately positioned with respect to said frame and carrier assembly.

9. A parallel optics subassembly for mating with a ferrule supporting an array  
20 of optical fibers adapted for carrying digital signals and having a set of alignment holes positioned in a precisely spaced relationship with said fibers, comprising:

25 a) a carrier assembly including a frame section for supporting an integrated circuit chip having an array of photoactive components; and  
b) a lens and alignment frame for defining an optical and mechanical interface between said carrier assembly and said ferrule which is attached to said carrier assembly in a precisely spaced relationship with said optoelectronic device, said frame including:

a tower extending outward from said frame including,  
an array of lenses for focusing light between said photoactive  
components and said fibers, and  
a set of guide pins projecting forward of said tower for mating  
with said alignment holes on said ferrule.

10. The parallel optics subassembly of claim 9, further including:

a receptacle for guiding and latching said ferrule into position including a window at the inner end of the receptacle.

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11. The parallel optics subassembly of claim 10, wherein:

said tower includes a pair of elevated end sections on which said guide pins are mounted and in between which said array of lenses is mounted.

15 12. The parallel optics subassembly of claim 10, wherein:

said receptacle includes a window at its inner end which mates with said tower for positioning said receptacle with respect to said frame.

13. The parallel optics subassembly of claim 11, wherein:

20 said array of lenses extends in a line between said elevated end sections.

14. A parallel optics subassembly for mating with a ferrule supporting an array of optical fibers adapted for carrying digital signals and having a set of alignment holes positioned in a precisely spaced relationship with said fibers, comprising:

a) a receptacle for guiding and latching said ferrule into position including a window at the inner end of the receptacle;

b) a carrier assembly including a frame section for supporting an optoelectronic device having an array of photoactive components, a flex circuit for providing electrical interconnections and a printed circuit board;

c) an electrical edge connector on one edge of said circuit board for pluggably interconnecting said subassembly with a jack mounted on a circuit board of a computer or communications system; and

5       d) a lens and alignment frame for defining a mechanical and optical interface between said ferrule and said carrier assembly which is attached to said carrier assembly in a precisely spaced relationship with said optoelectronic device, said frame including:

10            a tower extending outward from said frame for engaging said window in order to help position said receptacle with respect to said frame, and

15            a set of guide pins projecting forward of said tower for mating with said alignment holes on said ferrule in order to position said ferrule and fibers with respect to said frame, carrier assembly and optoelectronic device.

16. The parallel optics subassembly of claim 14, wherein:  
said tower rises up from a rectangular base and includes a pair of elevated end sections located on opposing ends of said base on which said guide pins are mounted.

17. The parallel optics subassembly of claim 15, wherein:  
said alignment frame also includes:  
an array of lenses for focusing light between said array of fibers and said array of photoactive components

18. The parallel optics subassembly of claim 14, wherein:  
said window in said receptacle is rectangular and said tower is rectangularly shaped so as to mate with said window.

18. The parallel optics subassembly of claim 14, wherein:

5        said carrier assembly is mechanically and electrically coupled together by said flex circuit which runs through and extends between said frame section and said circuit board.

10      19. A lens and alignment frame for use in optically and mechanically interfacing an integrated circuit chip having a set of photoactive components which is attached to a carrier assembly with a set of optical fibers supported in a ferrule having a set of alignment holes precisely positioned with respect to 10 said fibers, said frame including:

15        a planar base adapted for being mounted on said carrier assembly; a tower extending outward from said base; an array of lenses mounted on said tower for focusing light between said array of fibers and said array of photoactive components; and 20        a set of guide pins projecting forward of said tower for mating with said alignment holes in said ferrule in order to position said ferrule and fibers with respect to said frame, carrier assembly and said integrated circuit chip.

20. The lens and alignment frame of claim 19, wherein:

said tower is rectangularly shaped and includes a pair of elevated end sections on which said guide pins are mounted.